

EXHIBIT E

**FINAL REPORT
PHASE II ENVIRONMENTAL INVESTIGATION
for the
PINOLEVILLE INDIAN RESERVATION
UKIAH, CALIFORNIA**

Prepared for:

**PINOLEVILLE INDIAN RESERVATION
367 North State Street, Suite 204
Ukiah, California 95482-4444
(707) 463-1454**

prepared by:

**VECTOR ENGINEERING, INC.
143E Spring Hill Drive
Grass Valley, California 95945
(530) 272-2448**



**March 2003
Project No. 021222.00**

Plaintiff's Exchange Documents
Pinoleville v. UAD

TABLE OF CONTENTS

1.0 INTRODUCTION AND BACKGROUND.....	1
2.0 PURPOSE AND OBJECTIVE.....	2
3.0 METHODOLOGY AND FIELD PROGRAM.....	3
3.1 Drilling Methods	3
3.2 Sampling Procedures.....	3
3.3 Analytical Methods	4
4.0 FINDINGS	5
4.1 General Findings.....	5
4.2 Geology and Groundwater	5
4.2.1 Soil Types Encountered	5
4.2.2 Depths to Groundwater	5
4.3 Analytical Testing Results	6
4.3.1 Soil Samples	6
4.3.2 Groundwater Samples.....	6
5.0 CONCLUSIONS	8
5.1 General Description.....	8
5.2 Nature and Extent of Contamination and Data Validity	8
5.2.1 Groundwater	8
5.2.2 Soils	10
5.3 Relation of Contamination of Soil and Groundwater	10
5.4 Source(s) of Detected Contamination.....	11
5.5 Transport Mechanisms and Exposure Pathways.....	12
5.6 Monitoring and Remediation.....	12
5.6.1 Monitoring Existing Conditions	12
5.6.2 Future Uses	12
6.0 LIMITATIONS	14

4.0 FINDINGS

4.1 General Findings

During the field investigation, no evidence of massive contamination was observed based on the cuttings retrieved from the drilling process, the soil sampling, or from the groundwater sampling. Visual evidence of small isolated spills of fuels or motor oil on the ground surface was present within the two parcels. No visual surface spills were noted in the vicinity of the soil borings.

4.2 Geology and Groundwater

4.2.1 Soil Types Encountered

The vast majority of soils encountered during the drilling program were sedimentary deposits consisting of silty sands and sandy silts that were placed as alluvial deposits from depositional episodes of the nearby Ackerman Creek. No sediments larger than sand sized material were encountered during the drilling program, and no definitive strata was observed that may act as a preferred conduit for lateral migration of groundwater.

4.2.2 Depths to Groundwater

Depth of groundwater was found to range from approximately 11 to 12.5 feet below ground surface in all borings that intersected the standing water table. Boring B473 was drilled to a total depth of 22 feet below ground surface without encountering groundwater. For this reason, the depth to groundwater was not recorded, nor was a groundwater sample collected. The depths to groundwater and total boring depths are listed in the table below.

Phase II Environmental Investigation
Pinoleville Indian Reservation, Ukiah, California

March 2003
Job No. 021222.00

Depth to Groundwater (11/02/02)

Boring	Water Depth (ft, BGS)	Total Depth (ft, BGS)
B471	12.08	13.29
B472	11.45	12.88
B473	DRY	22.50
B781	11.05	14.81
B482	11.33	11.91
B483	12.55	12.96

Although the ground surface elevations at the boring locations were not surveyed for the development of an accurate groundwater flow direction map, the general flow direction of the groundwater aquifer oriented to the south away from Ackerman Creek.

4.3 Analytical Testing Results

4.3.1 Soil Samples

The results of the analytical testing program found only one soil sample to contain measurable concentrations of organic compounds. This sample, from boring B471, was retrieved at the 2-foot depth relative to ground surface and contained 1.6 mg/L of Total Petroleum Hydrocarbons as Diesel.

All samples contained measurable quantities of the metals chromium, lead, nickel, and zinc. No samples contained measurable quantities of cadmium.

4.3.2 Groundwater Samples

Groundwater samples were obtained from B471, B472, B481, B482, and B483. No groundwater was encountered in boring B473.

Of the five wells that were sampled, no organic compounds were detected. As with the soil samples, all groundwater samples retrieved showed detectable concentrations of

Plaintiff's Exchange Documents
Pinoleville v. UAD

284

Phase II Environmental Investigation
Pinoleville Indian Reservation, Ukiah, California

March 2003
Job No. 021222.00

chromium, lead, nickel, and zinc. The presence of cadmium was not found in any sample tested.

5.0 CONCLUSIONS

5.1 General Description

No evidence of subsurface contamination was observed during the field investigation, either within the drilling cuttings, soil samples, or within the groundwater samples. In addition, no evidence of surface contamination, such as significant fuel spills or obvious waste materials, was observed within the vicinity of the boring locations, although minor waste products were present in the area. On a larger scale, some fuel spills on the ground were observed in areas outside of the immediate drilling area, typical of the type of spill expected within an automobile dismantling yard. These spills, however, did not appear to represent large volume spills that would have resulted in long term ponding and possible infiltration of large quantities of liquid waste products.

5.2 Nature and Extent of Contamination and Data Validity

5.2.1 Groundwater

No organic parameters were found in any of the five groundwater samples collected during the site investigation. All five samples did contain some measurable quantity of the inorganics tested, with the exception of cadmium, that was found to be below the detection limits. Levels of chromium, nickel, and zinc in the groundwater were found to exceed either the Maximum Contaminant Level or the Secondary Drinking Water Standards, as defined in Articles 4 and 16 of Chapter 15, Title 22, California Code of Regulations.

Accounting for the dry hole in B473, the average of the metal concentrations collected from borings B471, B472, B481, B482 and B483 are shown in the table below.

Analytical Testing Results for Inorganic Metals (11/04/02)

Metal	B471	B472	B481	B482	B483	Mean-4	Stdev-4	Mean-5	Stdev-5
Chromium	0.64	1.2	1.3	0.61	18	0.94	0.36	4.35	7.64
Lead	0.06	0.19	0.22	0.16	2.4	0.16	0.07	0.61	1.00
Nickel	0.93	2	3.2	1.9	32	2.0	0.93	8.0	13.44
Zinc	0.48	0.99	1.6	0.88	14	.99	0.46	3.59	5.83

The columns labeled Mean-4 and Stdev-4 shows the means and standard deviations of the four wells B471, B472, B481, and B482. The columns labeled Mean-5 and Stdev-5 shows the means and standard deviations of all five wells. Of particular note is the significantly higher mean and standard deviation of the five well data relative to that of the data with well B483 removed. The means for each of the four metals are about 4 times higher when using the data from all five wells, while the standard deviation ranges from 12 to 21 times higher. As it applies to the four metals analyzed, a comparison in the standard deviations indicate the groundwater withdrawn from boring B483 is significantly different than groundwater samples retrieved from the other four wells.

Although the water quality data for the B483 groundwater sample suggests that this sample had been impacted in a way that increased the metal concentrations in the water, this is not the case. The analytical method used for this water sample, specifically EPA Method 200.8, requires an acid digestive process prior to performing the analytical testing. This digestion process puts into solution the metal components within any silts or dirt particles that were collected with the water sample. As a result, this method not only records the metal concentrations already in solution within the water sample, but also the metal concentrations that were within any soil particles that may also be in the water sample. For this reason, the water sample retrieved from

Accounting for the dry hole in B473, the average of the metal concentrations collected from borings B471, B472, B481, B482 and B483 are shown in the table below.

Analytical Testing Results for Inorganic Metals (11/04/02)

Metal	B471	B472	B481	B482	B483	Mean-4	Stdev-4	Mean-5	Stdev-5
Chromium	0.64	1.2	1.3	0.61	18	0.94	0.36	4.35	7.64
Lead	0.06	0.19	0.22	0.16	2.4	0.16	0.07	0.61	1.00
Nickel	0.93	2	3.2	1.9	32	2.0	0.93	8.0	13.44
Zinc	0.48	0.99	1.6	0.88	14	.99	0.46	3.59	5.83

The columns labeled Mean-4 and Stdev-4 shows the means and standard deviations of the four wells B471, B472, B481, and B482. The columns labeled Mean-5 and Stdev-5 shows the means and standard deviations of all five wells. Of particular note is the significantly higher mean and standard deviation of the five well data relative to that of the data with well B483 removed. The means for each of the four metals are about 4 times higher when using the data from all five wells, while the standard deviation ranges from 12 to 21 times higher. As it applies to the four metals analyzed, a comparison in the standard deviations indicate the groundwater withdrawn from boring B483 is significantly different than groundwater samples retrieved from the other four wells.

Although the water quality data for the B483 groundwater sample suggests that this sample had been impacted in a way that increased the metal concentrations in the water, this is not the case. The analytical method used for this water sample, specifically EPA Method 200.8, requires an acid digestive process prior to performing the analytical testing. This digestion process puts into solution the metal components within any silts or dirt particles that were collected with the water sample. As a result, this method not only records the metal concentrations already in solution within the water sample, but also the metal concentrations that were within any soil particles that may also be in the water sample. For this reason, the water sample retrieved from

Phase II Environmental Investigation
Pinoleville Indian Reservation, Ukiah, California

March 2003
Job No. 021222.00

Accounting for the dry hole in B473, the average of the metal concentrations collected from borings B471, B472, B481, B482 and B483 are shown in the table below.

Analytical Testing Results for Inorganic Metals (11/04/02)

Metal	B471	B472	B481	B482	B483	Mean-4	Stdev-4	Mean-5	Stdev-5
Chromium	0.64	1.2	1.3	0.61	18	0.94	0.36	4.35	7.64
Lead	0.06	0.19	0.22	0.16	2.4	0.16	0.07	0.61	1.00
Nickel	0.93	2	3.2	1.9	32	2.0	0.93	8.0	13.44
Zinc	0.48	0.99	1.6	0.88	14	.99	0.46	3.59	5.83

The columns labeled Mean-4 and Stdev-4 shows the means and standard deviations of the four wells B471, B472, B481, and B482. The columns labeled Mean-5 and Stdev-5 shows the means and standard deviations of all five wells. Of particular note is the significantly higher mean and standard deviation of the five well data relative to that of the data with well B483 removed. The means for each of the four metals are about 4 times higher when using the data from all five wells, while the standard deviation ranges from 12 to 21 times higher. As it applies to the four metals analyzed, a comparison in the standard deviations indicate the groundwater withdrawn from boring B483 is significantly different than groundwater samples retrieved from the other four wells.

Although the water quality data for the B483 groundwater sample suggests that this sample had been impacted in a way that increased the metal concentrations in the water, this is not the case. The analytical method used for this water sample, specifically EPA Method 200.8, requires an acid digestive process prior to performing the analytical testing. This digestion process puts into solution the metal components within any silts or dirt particles that were collected with the water sample. As a result, this method not only records the metal concentrations already in solution within the water sample, but also the metal concentrations that were within any soil particles that may also be in the water sample. For this reason, the water sample retrieved from

Plaintiff's Exchange Documents
Pinoleville v. UAD

boring B483 shows relatively high metals concentrations because the original sample collected in the field contained a high silt load and was extremely dirty due to considerable difficulties during the collection and retrieval of the groundwater sample. The published water quality results for this sample show high concentrations of metals because the soils that were analyzed with the water sample already contain a relatively high concentration of these metals.

5.2.2 Soils

As with the groundwater samples, the soils samples retrieved from each of the boring were analyzed for the same five metals, specifically, cadmium, chromium, lead, nickel, and zinc. Comparing the concentrations of each of these metals by use of the mean and standard deviation, several wells and individual metals have shown higher concentrations than expected.

Of the 80 individual metal tests that were performed on the soil samples, a total of 7 were found to exceed the mean plus one standard deviation, and of these, 3 were found to exceed the mean plus two standard deviations. The presence of lead in B471-2 at a concentration of 12 mg/Kg exceeded the mean plus three standard deviations.

Of particular note is the relatively high concentration of zinc and nickel in the soils retrieved from boring B483. The concentrations detected show 95 mg/Kg and 130 mg/Kg at the 2 and 7-foot depths, respectively. Both of these positive hits represent a concentration at the mean plus two standard deviation level.

5.3 *Relation of Contamination of Soil and Groundwater*

With the exception of minor surface contamination of TPH-Diesel detected in a soil sample from B471, no organic contaminants were detected within any of the soil samples retrieved from the borings, nor from the groundwater samples. For this reason, no evidence exists to suggest that a correlation between contaminants found in the groundwater and the soil is present.

Although there does appear to be a possible correlation between the groundwater and the soils for the inorganic constituents, this correlation is not suggestive of environmental contamination. As mentioned previously, the analytical testing methods used, namely EPA Method 200.8, records the metal concentration in both the liquid and solid components of a sample. This occurrence may result in the mistaken conclusion that an aquifer contains metals contamination when, in fact, the individual samples collected contained a high quantity of silt particles.

Results of the soil analytical testing of samples retrieved from boring B483 show relatively high concentrations of zinc and lead from the 2 and 7 foot depths, respectively. In addition, the groundwater sample collected from this boring showed relatively high concentrations of these two metals, as well as nickel and chromium. As mentioned, these high concentrations are likely the result of silt present within the water sample.

5.4 Source(s) of Detected Contamination

As mentioned, the only detected organic contaminant found in the groundwater and soil samples collected as part of this investigation was a small amount of Total Petroleum Hydrocarbons as Diesel which was found in the 2 foot sample in boring B471. Given the presence of surface contamination within the parcel due to the automobile dismantling activities, the source of this contamination is very likely related to spilled fuel on the ground surface in the vicinity of the boring. No evidence was observed during the drilling activity, nor is any evidence present in the analytical testing results, that suggests a heavy degree of contamination to the subsurface soils and groundwater beneath these two parcels.

Plaintiff's Exchange Documents
Pinoleville v. UAD

289

The soil samples within the area of investigation are composed of sediments that originated from mafic and ultra-mafic rock types common in the northern California coastal ranges. These rocks typically contain high concentrations of metals such as

those analyzed in this study. Analytical data on groundwater samples collected from aquifers within these rock and soil types commonly contain high concentrations of the soluble metals characteristic of the host rock.

As discussed previously, the presence of high concentrations of chromium, lead, nickel and zinc within the water samples collected at the site are likely a result of soil particles within the sample also being quantified. The groundwater aquifer shows high metals concentrations because the metal ions in the soil go into solution when saturated. These metal ions have been detected in the groundwater sample.

5.5 Transport Mechanisms and Exposure Pathways

No major soil or groundwater contamination was detected as part of this investigation, therefore, a transport mechanism and exposure pathway of this contamination does not presently exist. In the event a major fuel or oil spill did occur in the future, the likely migration and transport mechanism would be migration of these liquids contaminants vertically downward through the pores of the vadose zone above the static water table. Once the contaminants migrate into the aquifer, these organic compounds would likely be carried with the groundwater in the downgradient flow direction.

5.6 Monitoring and Remediation

5.6.1 Monitoring Existing Conditions

The recommended monitoring tasks for the parcels includes regular inspections of the site activities as it relates to surface spills and preventive measures to ensure that any significant environmental impact is addressed immediately. Based on the findings of this investigation, the installation of permanent groundwater monitoring wells and regular analytical testing is not warranted as a detection monitoring program.

5.6.2 Future Uses

With appropriate removal of the solid waste materials, automobile parts, and equipment from the site, a detailed surface soil removal program can be initiated. It is expected

Phase II Environmental Investigation
Pinoleville Indian Reservation, Ukiah, California

March 2003
Job No. 021222.00

that this remedial activity would include no more than the removal and disposal of surface soils that have been contaminated by small and confined spills of liquid wastes such as fuels and oils. Once the parcels have been cleaned, the future use of the parcels will be limited only by zoning and local ordinance restrictions.